

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**



U.S. Patent Application Serial No. 09/977,521

Attorney Docket No. 16159.095001; P6024

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : David S. ALLISON

Art Unit : 2122

Serial No.: 09/977,521

Examiner : Andre R. Fowlkes

Filed : October 12, 2001

Confirmation No.: 3955

Title : METHOD AND APPARATUS FOR PROVIDING AN ITERATION  
OPERATOR FOR AN OBJECT INSTANCE IN A DYNAMICALLY TYPED  
LANGUAGE

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

**DECLARATION PURSUANT TO 37 CFR §1.131**

In connection with the Applicant's Response to the Office Action issued on April 5, 2004, this declaration sets forth the pertinent facts proving conception of the claimed invention prior to August 30, 2001.

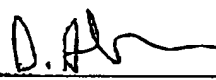
1. I, David S. Allison, am the listed inventor on U.S. Patent Application 09/977,521 entitled "Method and Apparatus for Providing an Iteration Operator for an Object Instance in a Dynamically Typed Language" filed October 12, 2001.
2. I, David S. Allison, conceived the claimed invention by at least February 23, 2001, as evidenced in the attached invention disclosure form entitled "Providing an Iteration Operator for an Object Instance in a Dynamically Typed Language" submitted on February 23, 2001.

U.S. Patent Application Serial No. 09/977,521  
Attorney Docket No. 16159.095001; P6024

3. I, David S. Allison, diligently worked on the reduction to practice of the invention from, at least, the conception date established by the attached invention disclosure form until, at least, the date of constructive reduction to practice established by the filing of U.S. Patent Application 09/977,521 on October 21, 2001.

I, David S. Allison, hereby declare that all statements made herein of my own knowledge are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this day 27, of July 2004.

  
\_\_\_\_\_  
David S. Allison

68535\_1

Mail for Diane Terry-Davis

JUL 29 2004

Fri, 23 Feb 2001 17:51:52 -0800 (PST)

Page

2

1. TITLE: Providing an iteration operator for an object instance in a dynamically typed language.

This invention relates primarily to (hardware or software): software

2. BACKGROUND AND RELATED ART

A. What is the technical problem which your invention addresses as specifically as you can. (If the technical problem is described in a document, article, book, etc., please give details in the next question.)

A language may contain a 'foreach' iteration statement. This allows the program to iterate through all elements of a variable. If, however, the variable is an instance of an object then the 'foreach' iterator is useless. This describes a method by which a dynamically typed language may provide iteration loops for instances of objects.

B. What is the Closest Related Art?

Please list the closest related art of which you're aware, including (1) published articles, books, etc.; (2) patents; (3) products (developed by Sun or another company); or (4) any other information you or your colleagues may be aware of at this time. Please give date(s) of all references, if known. <B>Note that you do not have to do a prior art search! If you're unaware of any relevant prior art, please say so.

'foreach' in UNIX shells and Perl. Iterators in C++. Operator overloading in C++ and other languages.

P6024 - Invention Disclosure - Allison

Mail for Diane Terry-Davis

Fri, 23 Feb 2001 17:51:52 -0800 (PST)

Page

3

-----

#### 4. WRITTEN DESCRIPTION

Please provide a written description of the invention (with reference to the drawings) or send a hard copy to: Dockering Coordinator at Mail Stop PAL01-521.

In your description, please indicate: (1) the problem(s) that the related art has been unable to solve; and (2) how your invention solves them. Stress the fundamental principle(s) of the invention from an engineering viewpoint.

If you already have a written description (such as a white paper) please note that here and send it by email or interoffice shuttle. (Email is preferable to inventions@Corp). However, please also provide a short (1-2 paragraph) description of the invention here, so we know what the focus is, since a white paper may cover many areas that are not this specific invention.

You should wait to submit any documents until you have received a P-number or at least CLEARLY indicate: 1) the invention title; 2) your name; and 3) the date of the disclosure submission.

The invention is described as follows:

Suppose a language was to provide a statement known as a 'foreach' statement whose purpose was to iterate through all the elements in a value and execute code for each iteration. Such a statement could look like:

```
foreach i vec {  
    // i contains each element of vec  
    // do something with i  
}
```

As an example, suppose the variable 'vec' contains the numbers {1,2,3,5,7,11}. The loop would execute 6 times. On each iteration, the variable 'i' would be set to each successive element of 'vec'.

This is a useful statement where the values supplied to it are of a known type and can be iterated through.

**P6024 - Invention Disclosure - Allison**

Mail for Diane Terry-Davis

Fri, 23 Feb 2001 17:51:52 -0800 (PST)

Page

4

All that is prior art and known. This invention relates to the application of such a 'foreach' statement to an instance of an object.

Suppose we have an instance of a class called X. In a traditional language you cannot apply a foreach loop to it:

```
var x = new X()           // instance of X
foreach i x (             // illegal
)
```

This is illegal because the language cannot determine what values the instance of X can have, and therefore cannot iterate through them.

In this invention, the class X can provide a special operator function that can return a set of values suitable for use in a 'foreach' loop:

```
class X {
  var value = {1,2,3,5,7}

  operator foreach() {
    return value
  }
}
```

Now we can use the 'foreach' loop to iterate through the values supplied by the 'foreach operator' in the class.

Why is this useful? In a dynamically typed language, the type of the argument to a foreach loop (and any other statement) is not known until runtime. For a foreach loop to be of any use, it must be able to be applied to any type - and an instance of a class is a common type. It also extends the idea of 'operator overloading' to a statement thus adding to the symmetry of the language.

INVENTOR 1: This person should be the primary or technical contact for the invention.

First Name: David

P6024 - Invention Disclosure - Allison

**Mall for Diane Terry-Davis**

**Fri, 23 Feb 2001 17:51:52 -0800 (PST)**

**Page**

**5**

**Middle Initial:**

**S**

**Last Name:**

**Allison**

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**P6024 - Invention Disclosure - Allison**

<b>CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)</b> Applicant(s): David S. Allison			<b>Docket No.</b> 16159.095001; P6024
<b>Serial No.</b> 09/977,521	<b>Filing Date</b> October 12, 2001	<b>Examiner</b> Andre R. Fowlkes	<b>Group Art Unit</b> 2122

**Invention:**

**METHOD AND APPARATUS FOR PROVIDING AN ITERATION OPERATOR FOR AN OBJECT INSTANCE IN A DYNAMICALLY TYPED LANGUAGE**

I hereby certify that the following correspondence:

Declaration Pursuant To 37 C.F.R. § 1.131 along with the required papers

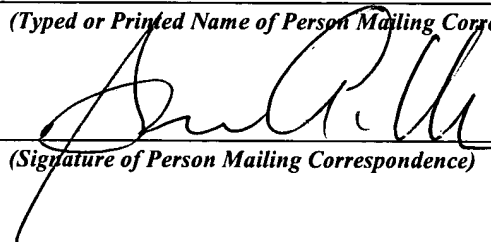
*(Identify type of correspondence)*

is being deposited with the United States Postal Service "Express Mail Post Office To Addressee" service under 37 CFR 1.10 in an envelope addressed to: Commissioner for Patents, P. O. Box 1450, Alexandria,

VA 22313-1450 on July 29, 2004  
*(Date)*

Grace A. Wise

*(Typed or Printed Name of Person Mailing Correspondence)*



*(Signature of Person Mailing Correspondence)*

EV526069698US

*("Express Mail" Mailing Label Number)*

**Note: Each paper must have its own certificate of mailing.**